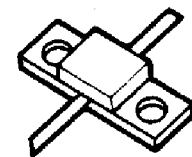


MRA0610
Series

7 to 7.8 dB
 600-1000 MHz
 3 TO 40 WATTS
 BROADBAND
 UHF POWER
 TRANSISTORS



CASE 394-01, STYLE 1
 (MRA .25)

The RF Line
UHF Power Transistors

... designed primarily for wideband, large-signal output and driver amplifier stages in the 600 to 1000 MHz frequency range.

- Designed for Class C, Common Base Power Amplifiers
- Specified 28 Volt, 1000 MHz Characteristics:
 - Output Power — 3 to 40 Watts
 - Power Gain — 7 to 7.8 dB Min, Common Base
 - Collector Efficiency — 50 to 55%
- Built-in Matching Network for Broadband Operation
- Gold Metallization for Improved Reliability
- Diffused Ballast Resistors

MAXIMUM RATINGS

| Rating | Symbol | -3 | -9 | -18A | -40A | Unit |
|--------------------------------|------------------|-------------|-----|------|------|-----------------|
| Collector-Base Voltage | V _{CES} | 50 | | | | V _{dc} |
| Emitter-Base Voltage | V _{EBO} | 3.5 | | | | V _{dc} |
| Collector Current — Continuous | I _C | 0.5 | 1.5 | 2.5 | 5 | A _{dc} |
| Operating Junction Temperature | T _J | 200 | | | | °C |
| Storage Temperature Range | T _{stg} | -65 to +150 | | | | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | | | | Unit |
|--|------------------|-----|---|---|-----|------|
| Thermal Resistance, RF, Junction to Case | R _{θJC} | 15 | 6 | 4 | 2.5 | °C/W |

ELECTRICAL CHARACTERISTICS

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|--|-----------|----------------------|-----|---|-----|------------------|
| Collector-Emitter Breakdown Voltage (I _C = 20 mA, V _{BE} = 0) | MRA0610-3 | V _{(BR)CES} | 50 | — | — | V _{dc} |
| (I _C = 60 mA, V _{BE} = 0) | -9 | | 50 | — | — | |
| (I _C = 100 mA, V _{BE} = 0) | -18A | | 50 | — | — | |
| (I _C = 200 mA, V _{BE} = 0) | -40A | | 50 | — | — | |
| Emitter-Base Breakdown Voltage (I _E = 0.25 mA, I _C = 0) | MRA0610-3 | V _{(BR)EBO} | 3.5 | — | — | V _{dc} |
| (I _E = 0.75 mA, I _C = 0) | -9 | | 3.5 | — | — | |
| (I _E = 1.25 mA, I _C = 0) | -18A | | 3.5 | — | — | |
| (I _E = 2.5 mA, I _C = 0) | -40A | | 3.5 | — | — | |
| Collector Cutoff Current (V _{CB} = 28 V, I _E = 0) | MRA0610-3 | I _{CBO} | — | — | 0.5 | mA _{dc} |
| | -9 | | — | — | 1.5 | |
| | -18A | | — | — | 2.5 | |
| | -40A | | — | — | 5 | |

(continued)

ELECTRICAL CHARACTERISTICS — continued

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

ON CHARACTERISTICS

| DC Current Gain ($I_C = 0.1 \text{ A}, V_{CE} = 5 \text{ V}$) ($I_C = 0.3 \text{ A}, V_{CE} = 5 \text{ V}$) ($I_C = 0.5 \text{ A}, V_{CE} = 5 \text{ V}$) ($I_C = 1 \text{ A}, V_{CE} = 5 \text{ V}$) | MRA0610-3 -9 -18A -40A | h_{FE} | 10 10 10 10 | — — — — | 100 100 100 100 | — |
|---|---------------------------------|----------|----------------------|------------------|--------------------------|---|
|---|---------------------------------|----------|----------------------|------------------|--------------------------|---|

DYNAMIC CHARACTERISTICS

| Output Capacitance ($V_{CB} = 28 \text{ V}, I_E = 0, f = 1 \text{ MHz}$) | MRA0610-3 -9 -18A -40A | C_{ob} | — — — — | — — — — | 4.5 10 14 28 | pF |
|---|---------------------------------|----------|------------------|------------------|-----------------------|----|
|---|---------------------------------|----------|------------------|------------------|-----------------------|----|

FUNCTIONAL TESTS

| Common-Base Amplifier Power Gain ($V_{CE} = 28 \text{ V}, P_{out} = 3 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 9 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 18 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 40 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) | MRAL0610-3 -9 -18A -40A | G_{PB} | 7.8 7.8 7.8 7 | — — — — | — — — — | dB |
|--|----------------------------------|----------|------------------------|------------------|------------------|----|
|--|----------------------------------|----------|------------------------|------------------|------------------|----|

| Collector Efficiency ($V_{CE} = 28 \text{ V}, P_{out} = 3 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 9 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 18 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) ($V_{CE} = 28 \text{ V}, P_{out} = 40 \text{ W}, f = 0.6 \text{ \& 1 GHz}$) | MRA0610-3 -9 -18A -40A | η_c | 50 55 50 50 | — — — — | — — — — | % |
|--|---------------------------------|----------|----------------------|------------------|------------------|---|
|--|---------------------------------|----------|----------------------|------------------|------------------|---|

**TYPICAL CHARACTERISTICS
MRA0610-3 — 3 WATTS BROADBAND**

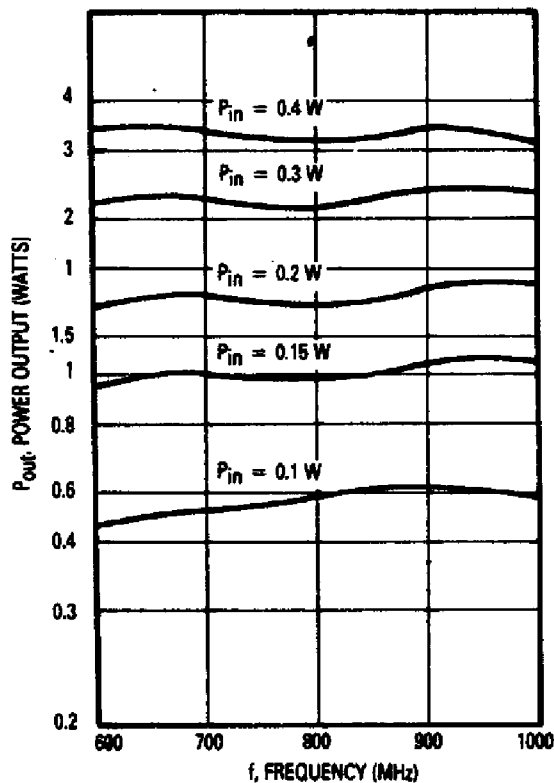
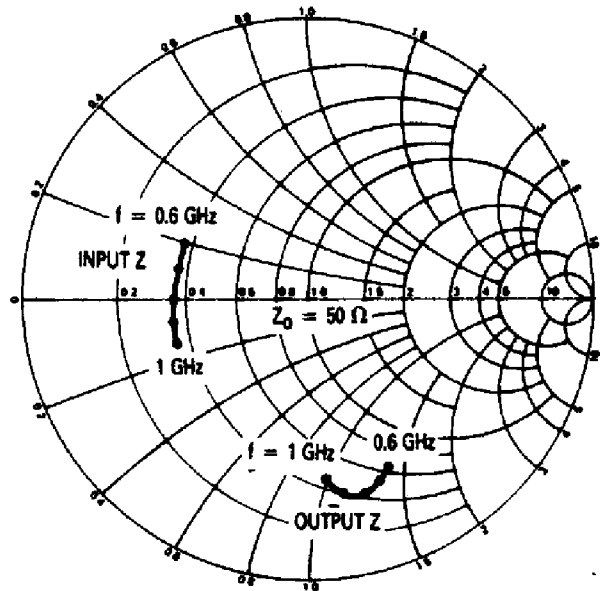


Figure 1. Power Output versus Frequency



**Figure 2. Series Equivalent Input/Output Impedance
 $V_{CC} = 28 \text{ V}$**

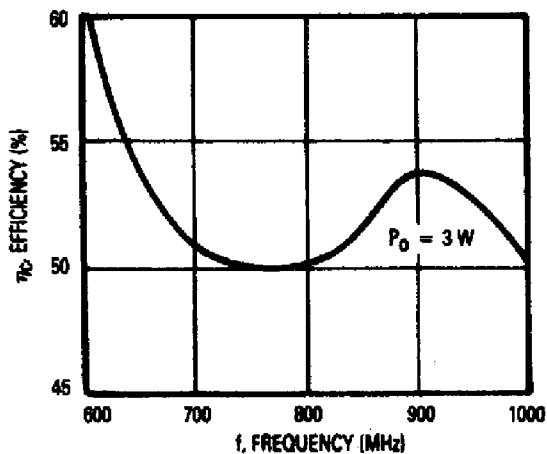


Figure 3. Efficiency versus Frequency

MRA0610 Series

TYPICAL CHARACTERISTICS

MRA0610-9 — 9 WATTS BROADBAND

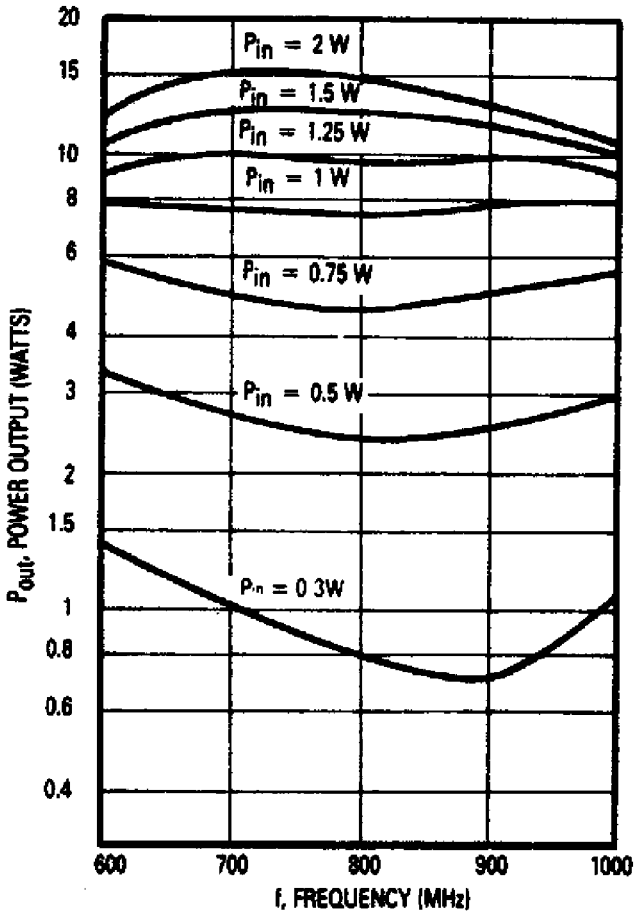


Figure 4. Power Output versus Frequency

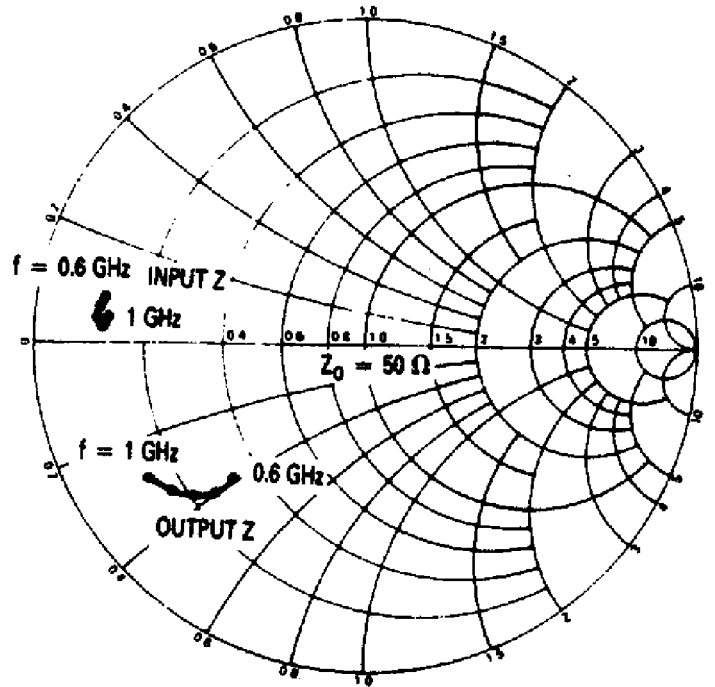


Figure 5. Series Equivalent Input/Output Impedance
 $V_{CC} = 28\text{ V}$

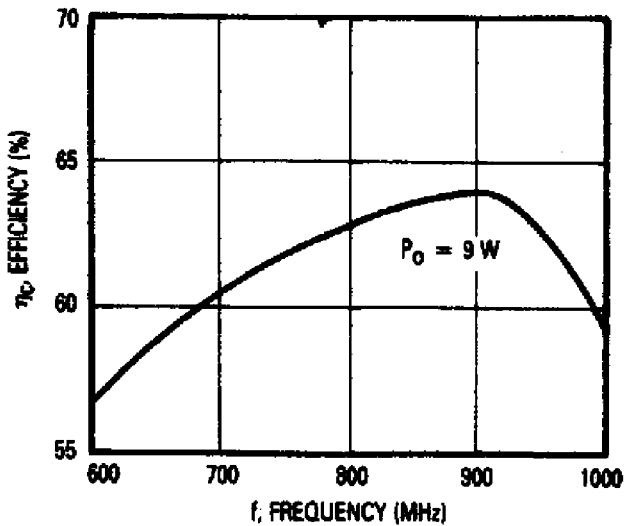


Figure 6. Efficiency versus Frequency

T.

MRA0610 Series

TYPICAL CHARACTERISTICS

MRA0610-18A — 18 WATTS BROADBAND

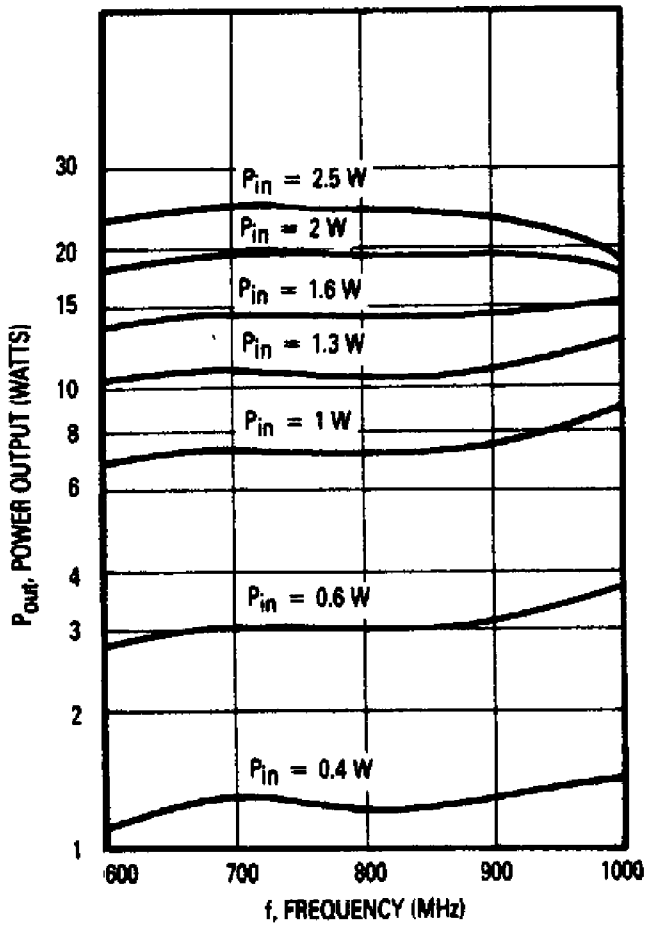


Figure 7. Power Output versus Frequency

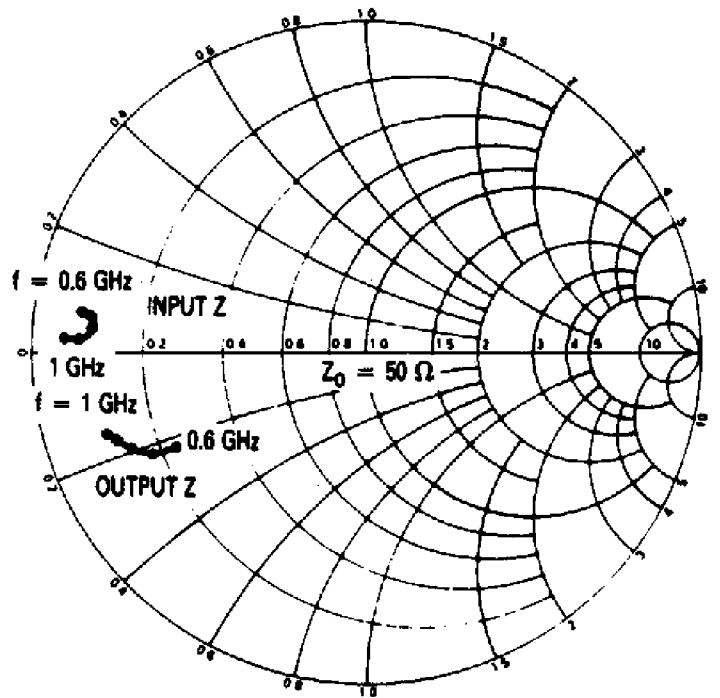


Figure 8. Series Equivalent Input/Output Impedance
 $V_{CC} = 28 V$

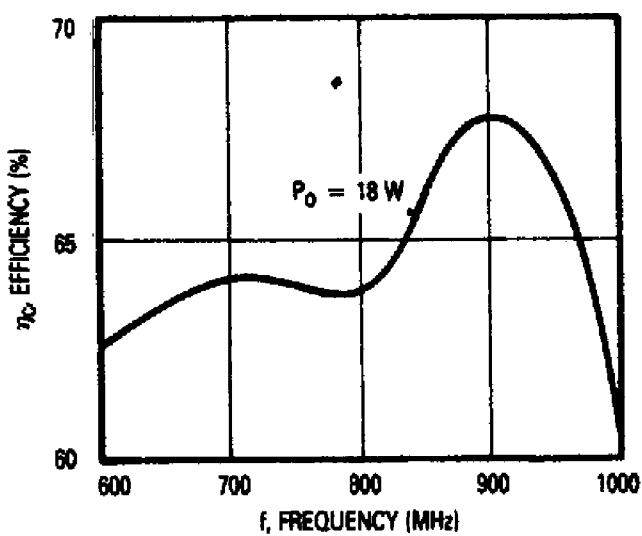


Figure 9. Efficiency versus Frequency

TYPICAL CHARACTERISTICS

MRA0610-40A — 40 WATTS BROADBAND

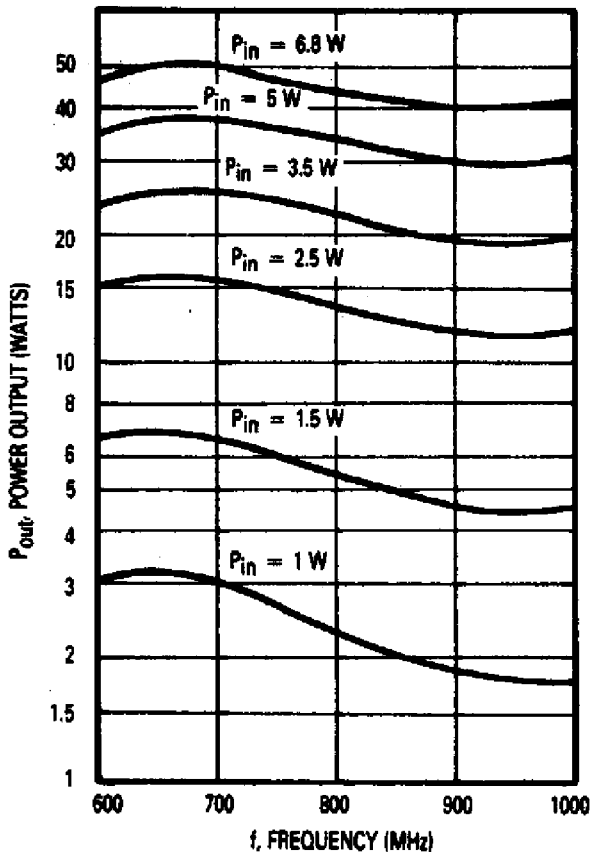


Figure 10. Power Output versus Frequency

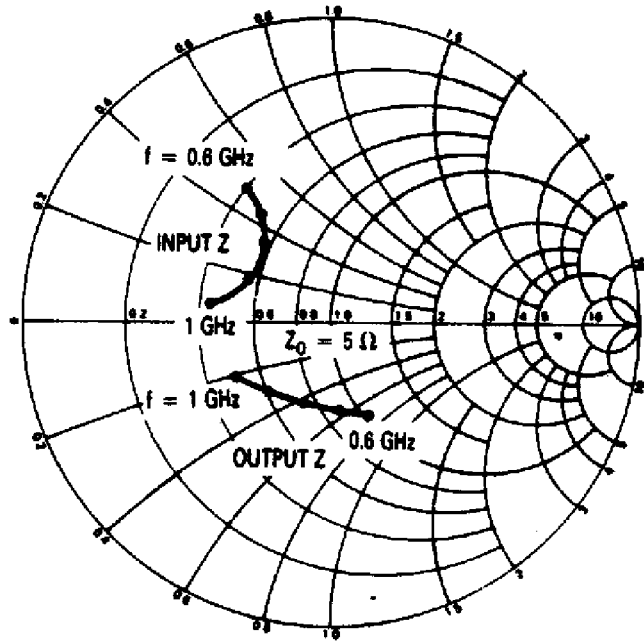


Figure 11. Series Equivalent Input/Output Impedance
V_{CC} = 28 V

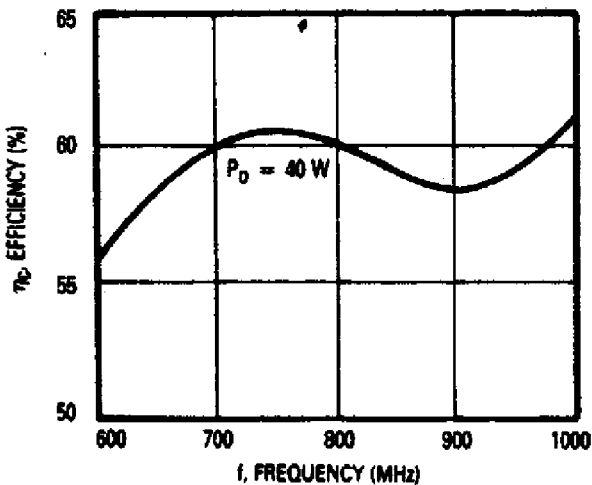


Figure 12. Efficiency versus Frequency

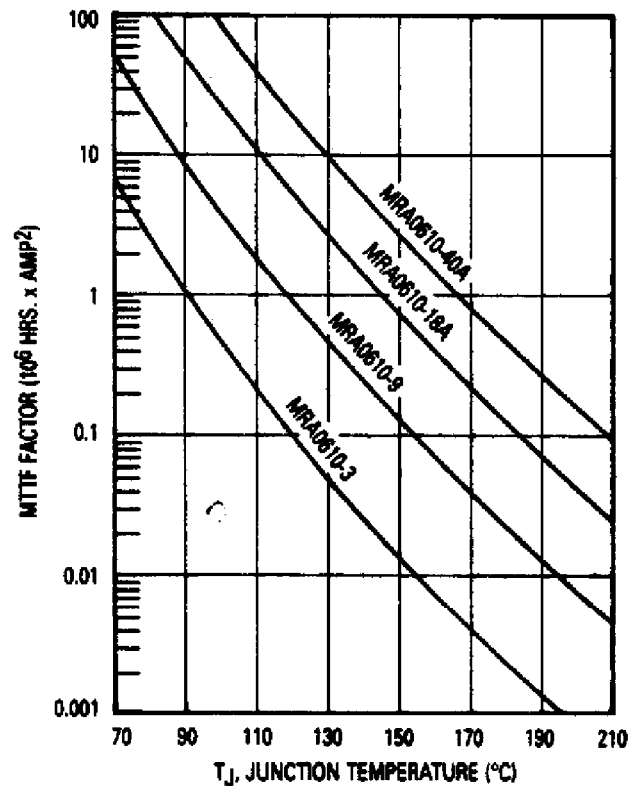
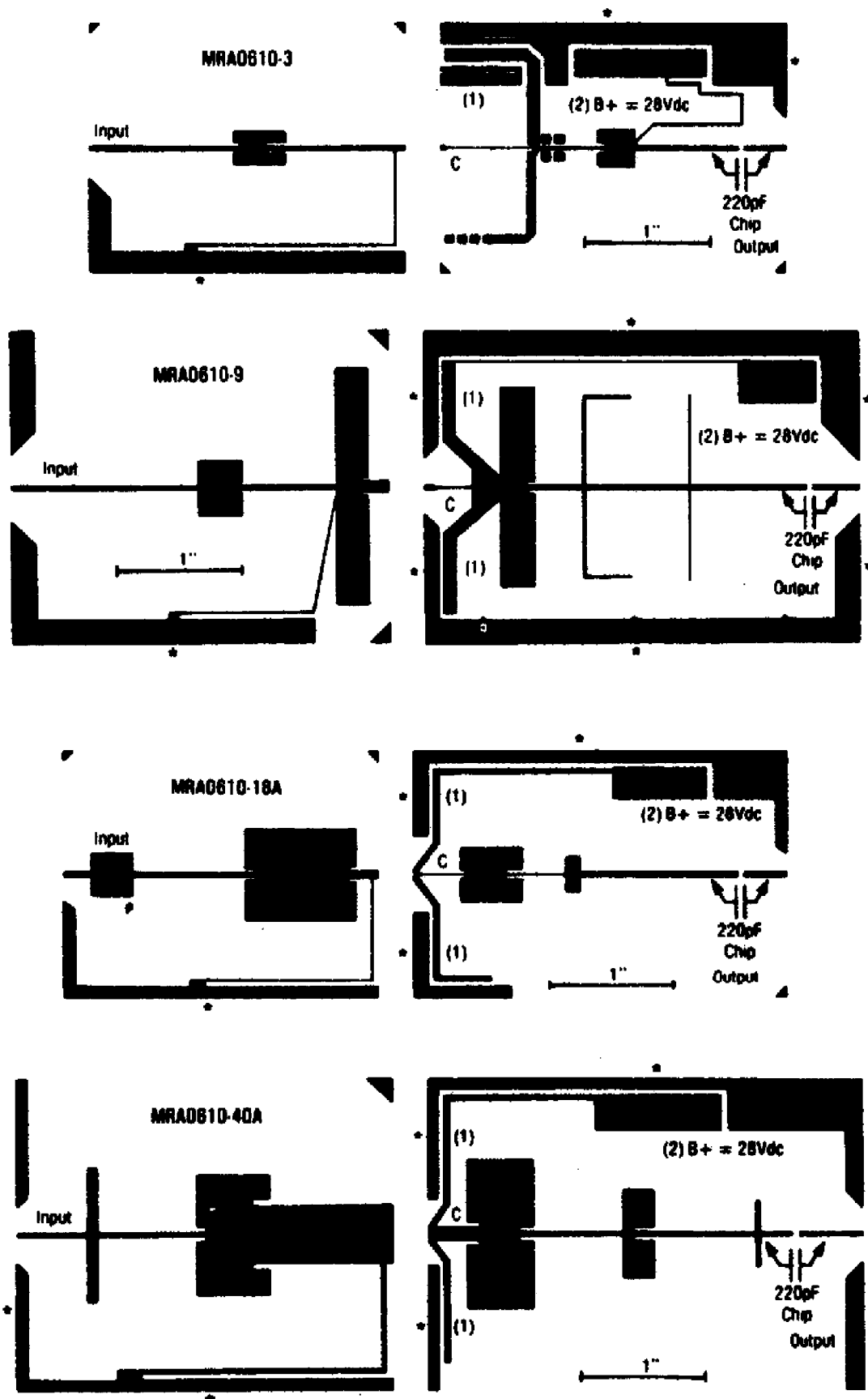


Figure 13. MTTF Factor versus Junction Temperature

Note: Divide by I_C² to obtain metal lifetime in hours



*Foil wrap or plate around to ground plane. Board material 0.020 inch glass-terfon $\epsilon = 2.55$.

(1) Bypass capacitor to ground for shunt inductor (220pF chip).

(2) Use B+ bypass of 0.01 and 1 μ F capacitors at this point.

Figure 14. Test Circuit Boards for MRA0610 Series

(Not to Scale)